

**Martinsburg, West Virginia Chesapeake Bay TMDL Public Meeting Summary**

**November 4, 2009**

**Robert C. Byrd Health and Science Center  
2500 Foundation Way  
Martinsburg, WV 25401**

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### **Agenda for Martinsburg, West Virginia Chesapeake Bay TMDL Meetings**

- Welcome, introductions, and meeting logistics – **Moderator, Joe Hankins**
- EPA presentation of the Chesapeake Bay TMDL and EPA expectations – **Rich Batiuk and Bob Koroncai, EPA**
- West Virginia's next steps and development of the Watershed Implementation Plan - **Alana Hartman, WV DEP**
- Public comments, questions and answers – **Moderator, Joe Hankins**
- Adjourn

## Attendee Detail

Webinar Register: 33

Webinar Attended: 21

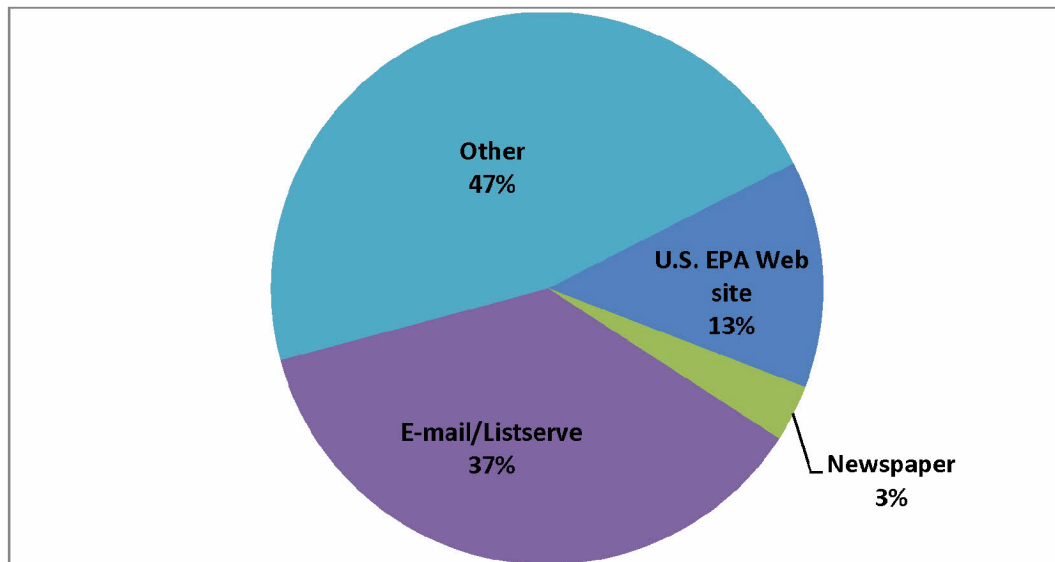
On-Site: 80

**Total Attendees: 101**

### **Registration Question:**

How did you hear about this Meeting?

- Other (14)
  - Chesapeake Bay Implementation Committee (2)
  - Work (2)
  - Word of Mouth (2)
  - Radio
  - WVDEP
  - Local PSD
  - Extension Service
- E-mail/Listserve (11)
- U. S. EPA Web Site (4)
- Newspaper (1)
- Other Web Site \_\_\_\_\_ (0)



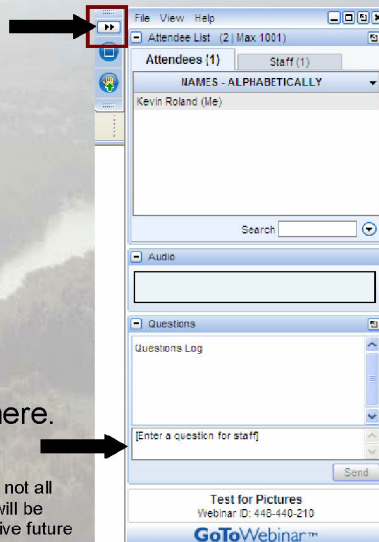
# THE CHESAPEAKE BAY TMDL: Restoring Waters of West Virginia and the Chesapeake Bay

Bay TMDL Public Meeting  
November 4, 2009  
Martinsburg, WV

Rich Batiuk and Bob Koroncai  
U.S. EPA Region III



- Click the double arrow to show or hide your control panel



- Type your questions here.  
(Indicate organization)

Note: Because of the large audience, not all questions will be answered, but they will be saved, and your questions will help drive future events and could contribute to a FAQ.







## Technical Issues?

Contact:

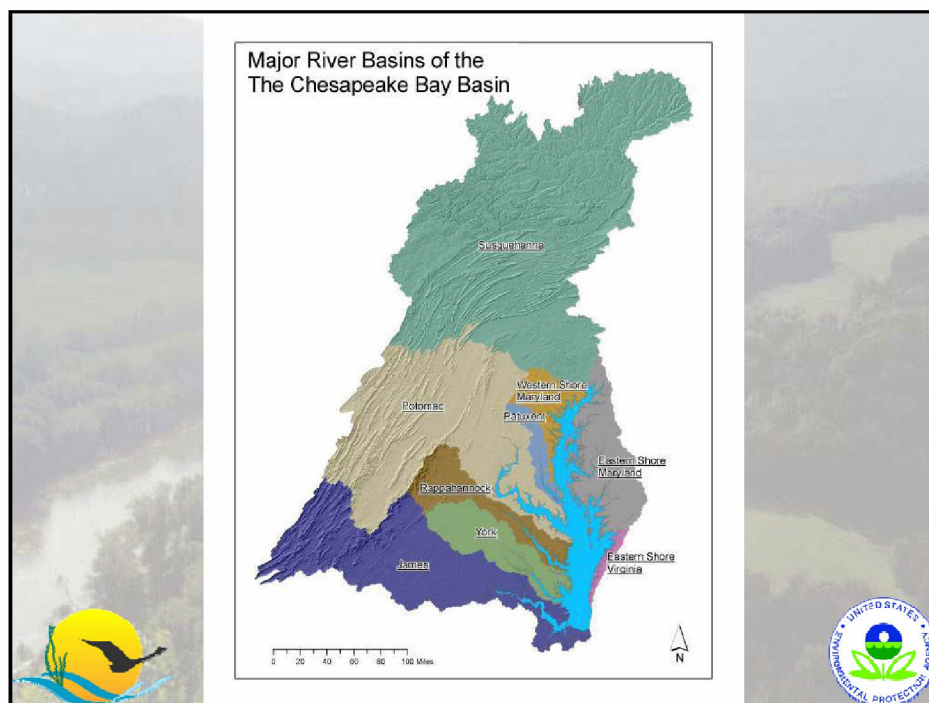
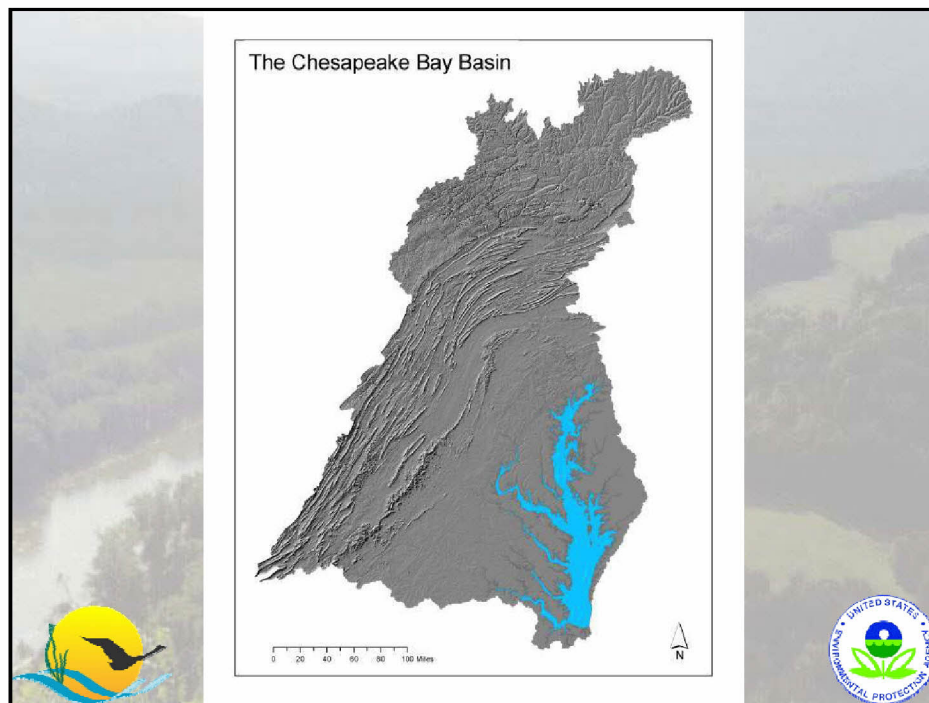
- Citrix Global Customer Support  
1-800-263-6317

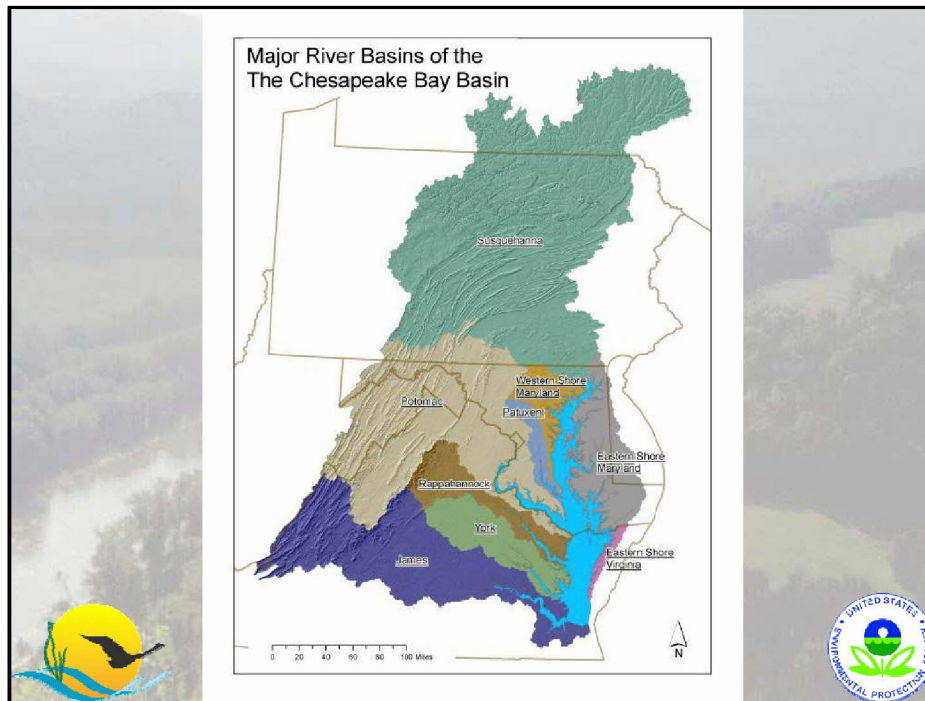


## AGENDA

- Welcome, introductions, and meeting logistics – Joe Hankins, Conservation Fund (5 minutes)
- EPA presentation of the Chesapeake Bay TMDL and EPA expectations – Rich Batiuk and Bob Koroncai, EPA (45 minutes)
- West Virginia's next steps and development of the Watershed Implementation Plan - Alana Hartman, WV DEP (10 minutes)
- Public comments, questions and answers - Joe Hankins 60 minutes)
- Adjourn







## West Virginia's Potomac River and Chesapeake Bay Basin

- Over 14% of West Virginia drains into the Potomac River and on to the Chesapeake Bay –that's 2,294,349 acres
- The Chesapeake Bay watershed in West Virginia includes Berkeley, Grant, Hampshire, Hardy, Jefferson, Mineral, Morgan, and Pendleton, and small portions of Preston and Tucker counties
- A small area of Monroe County also forms the headwaters of the James River

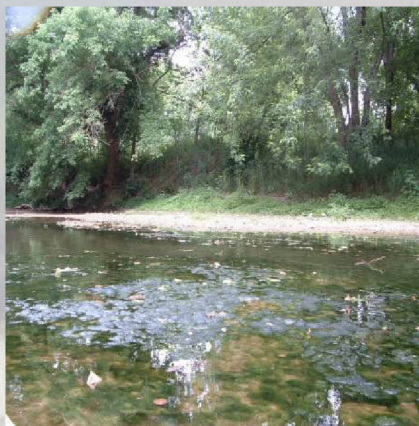




## Local Water Quality Issues



## Local Water Quality Issues

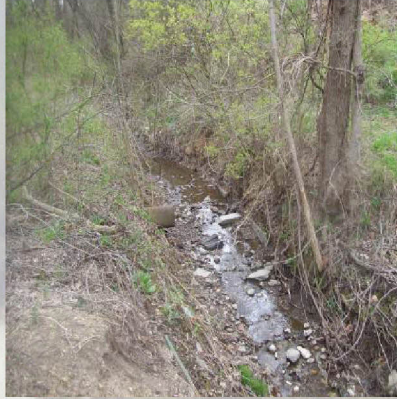


“If this water was like it should be, there’d be bass in here (Opequan Creek).”

Walter Hess  
*Martinsburg Journal*  
3/29/09



## Local Water Quality Issues



Stream off South Branch of Potomac



Mill Creek, Baker Heights



## Local Water Quality Issues



Insert graphic by Allison Carbo

- “Out here in the Eastern Panhandle, we do tend to have the worst scores (for variety of life forms found in waterways), especially in the Opequan.”
- “We’re all part of the problem, so we can all be part of the solution. The Opequan is a beautiful thing to protect and treasure...”

Alana Hartman, WV DEP  
*Martinsburg Journal*, 2009



## Local Water Quality Issues

- One of the major findings ... was the presence of intersexual characteristics in smallmouth and largemouth bass in the Potomac River and its tributaries.



USGS, FWS Study  
*Frederick News Post*, 10/25/09



## Chesapeake Bay Water Quality Issues





## Chesapeake Bay Watershed- By the Numbers

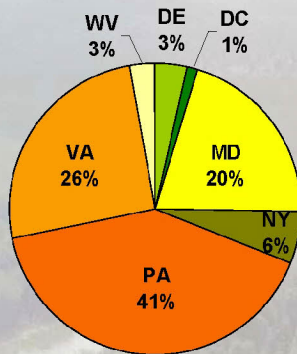
- Largest U.S. estuary
- Six-state, 64,000 square mile watershed
- 10,000 miles of shoreline (longer than entire U.S. west coast)
- Over 3,600 species of plants, fish and other animals
- Average depth: 21 feet
- \$750 million contribution annually to local economies
- Home to 17 million people (and counting)
- 77,000 principally family farms
- Declared "national treasure" by President Obama



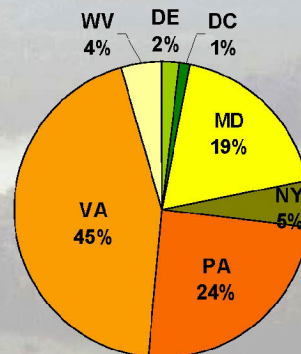
Source: [www.chesapeakebay.net](http://www.chesapeakebay.net)



## Nutrient Loads by State



**Nitrogen\***



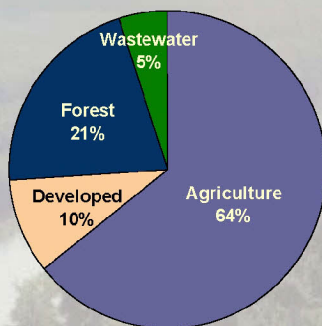
**Phosphorus**

\*EPA estimates a nitrogen load of 284 million lbs nitrogen in 2008. EPA assumes a reduction of 7 million lbs due to the Clean Air Act. This leaves 77 millions lbs to be addressed through the TMDL process.

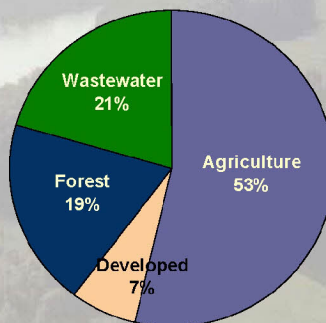


## Nutrient Sources of WV

Sources of Nitrogen from West Virginia



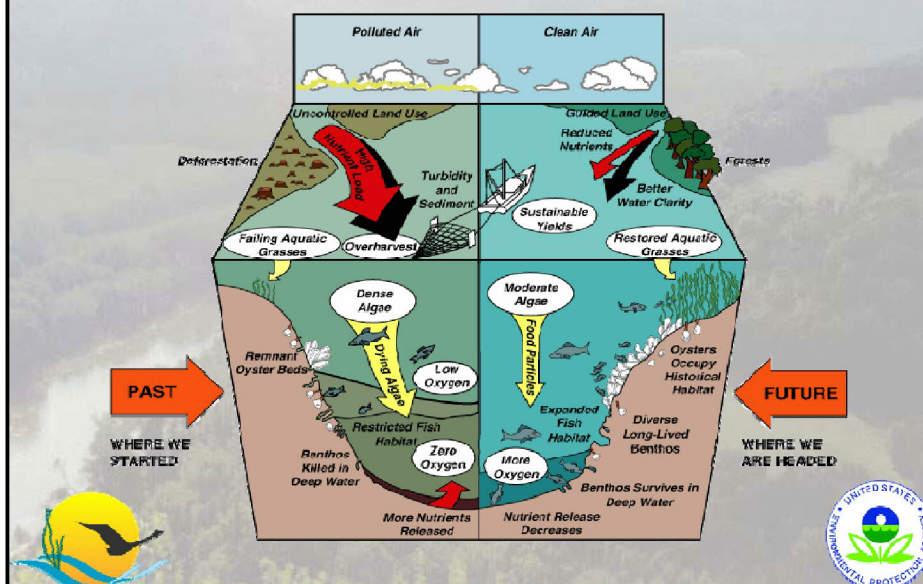
Sources of Phosphorus from West Virginia



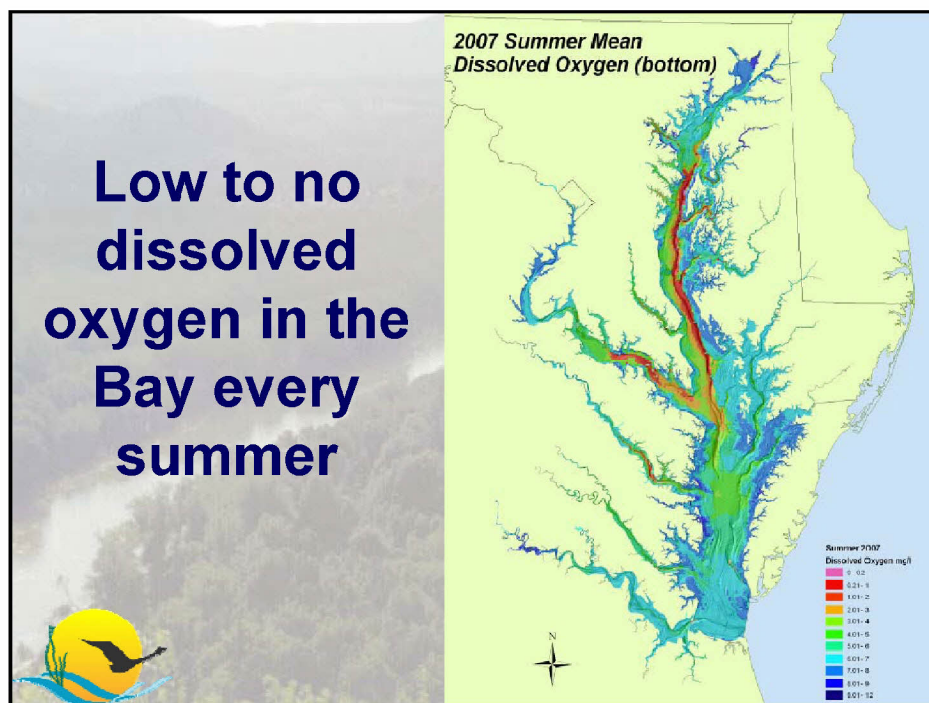
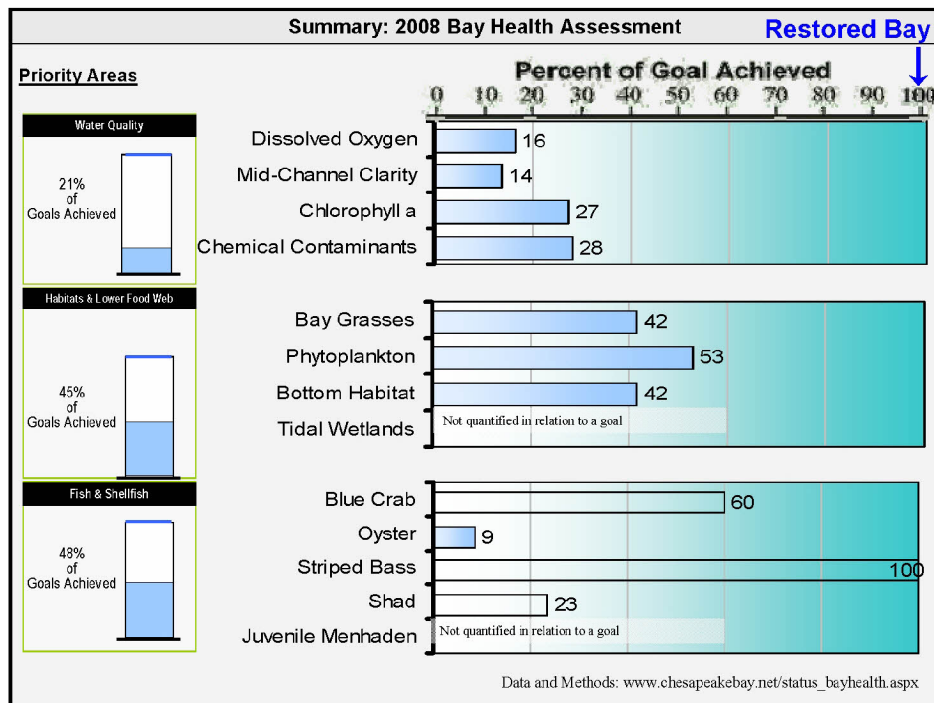
N and P values from 2008 Scenario of Phase 5.2 Watershed Model



## Chesapeake Bay Health- Past and Future





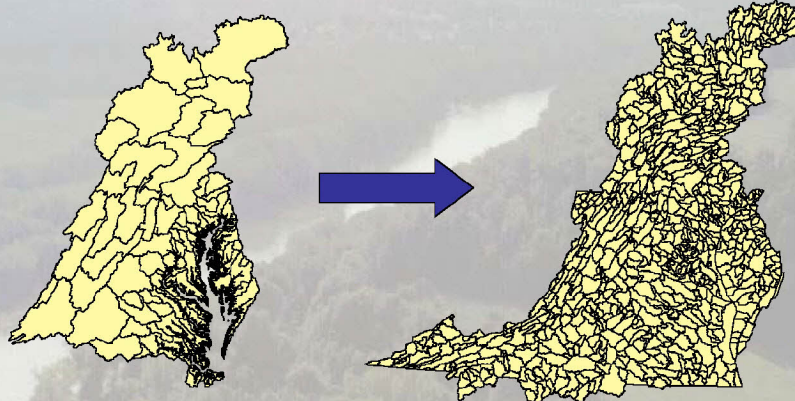


## The Chesapeake Bay TMDL

- EPA sets pollution diet to meet states' Bay clean water standards
- Load caps on nitrogen, phosphorus and sediment loads for all 6 Bay watershed states and DC
- States set load caps for point and non-point sources



## The Bay science supports local pollution diets...

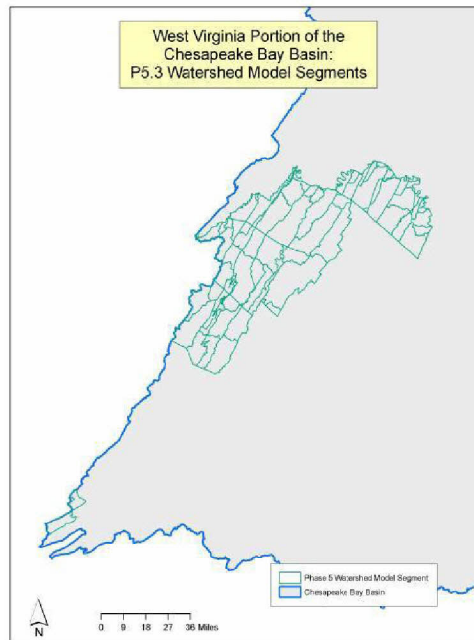


**Phase 4 Bay  
Watershed Model**  
(2000-2008)

**Phase 5 Bay  
Watershed Model**  
(2009- )

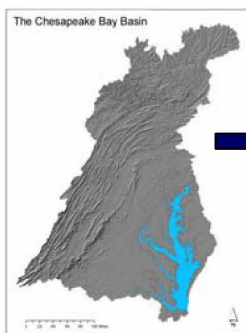


**...with  
detailed  
representation  
of West  
Virginia's  
many local  
watersheds by  
county**



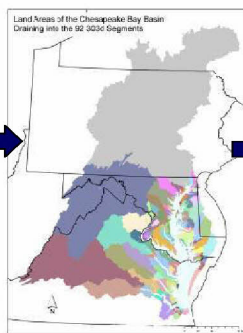
23

## **Taking Responsibility for Load Reductions**



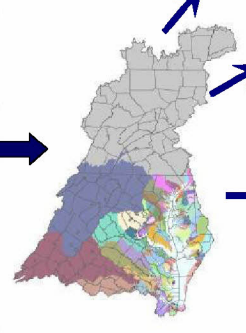
**Identify basinwide  
target loads**

EPA, States, DC



**Identify major  
basin by  
jurisdiction target  
loads**

EPA, States, DC



**Identify tidal segment  
watershed, county and source  
sector target loads**

States, DC, local governments  
& local partners





## What are the Target Pollutant Cap Loads for the Bay Watershed?

**Current** model estimates are that the states' Bay water quality standards can be met at basinwide loading levels of:

- 200 million pounds nitrogen per year
- 15 million pounds phosphorus per year



(Sediment target cap load under development-will be available by spring 2010)



## Dividing the Basinwide Target Loading

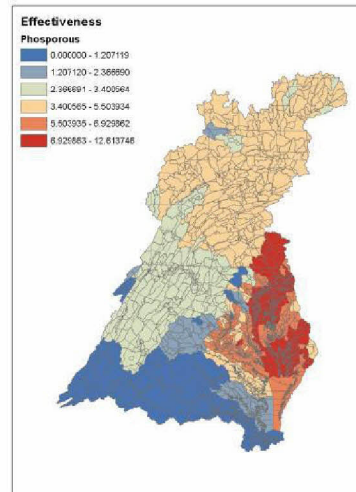
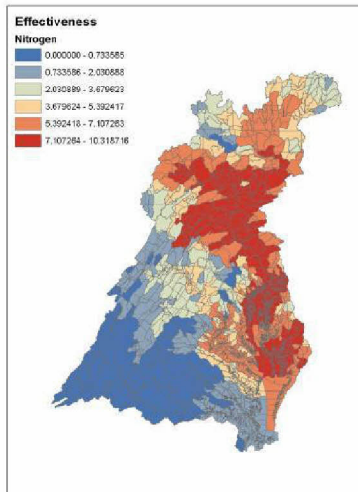


## Guidelines for Distributing the Basinwide Target Loads

- Water quality and living resource goals should be achieved.
- Waters that contribute the most to the problem should achieve the most reductions.
- All previous reductions in nutrient loads are credited toward achieving final cap loads.



## Nutrient Impacts on Bay WQ



## Current State Target Loads

Nitrogen		
State	Tributary Strategy	Target Load
DC	2.12	2.37
DE	6.43	5.25
MD	42.14	41.04
NY	8.68	10.54
PA	73.17	73.64
VA	59.30	59.22
WV	5.69	5.71
<b>Total</b>	<b>197.53</b>	<b>197.76</b>

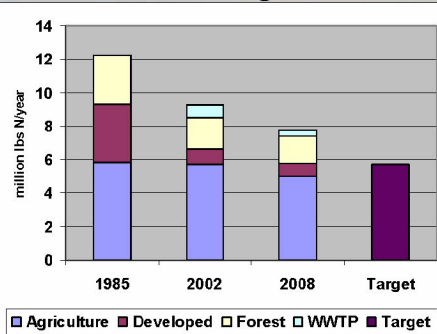
Phosphorus		
State	Tributary Strategy	Target Load
DC	0.10	0.13
DE	0.25	0.28
MD	2.56	3.04
NY	0.56	0.56
PA	3.10	3.16
VA	7.92	7.05
WV	0.45	0.62
<b>Total</b>	<b>14.93</b>	<b>14.84</b>

All loads are in millions of pounds per year.

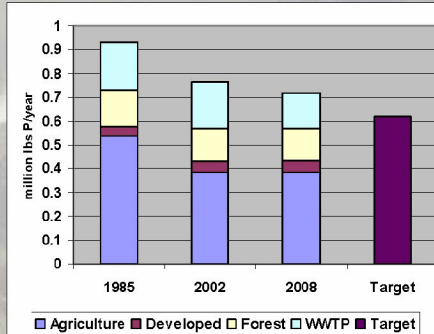


## West Virginia's Past, Present and Future Estimated Loads

Nitrogen



Phosphorus



All scenarios run through Phase 5.2 Watershed Model

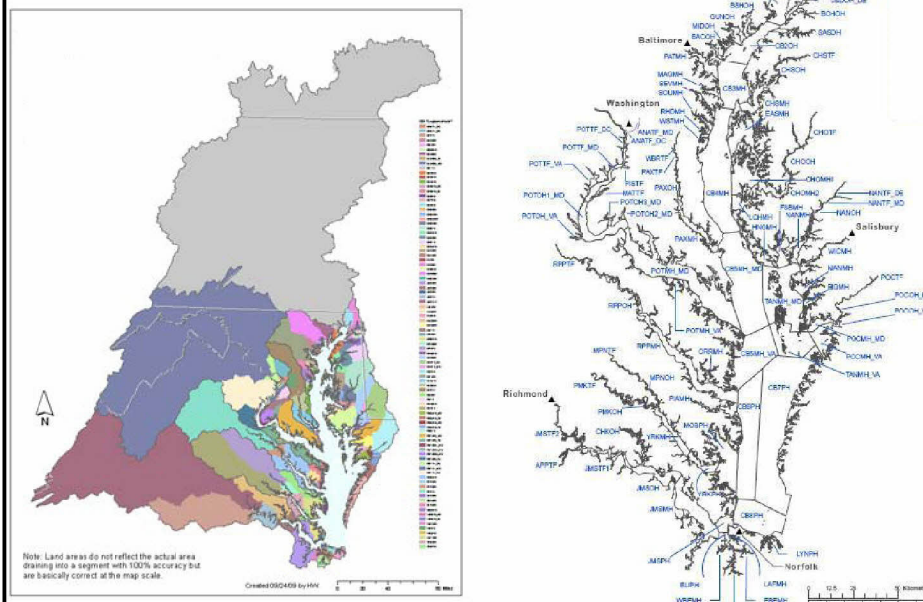


## Target Load Refinements

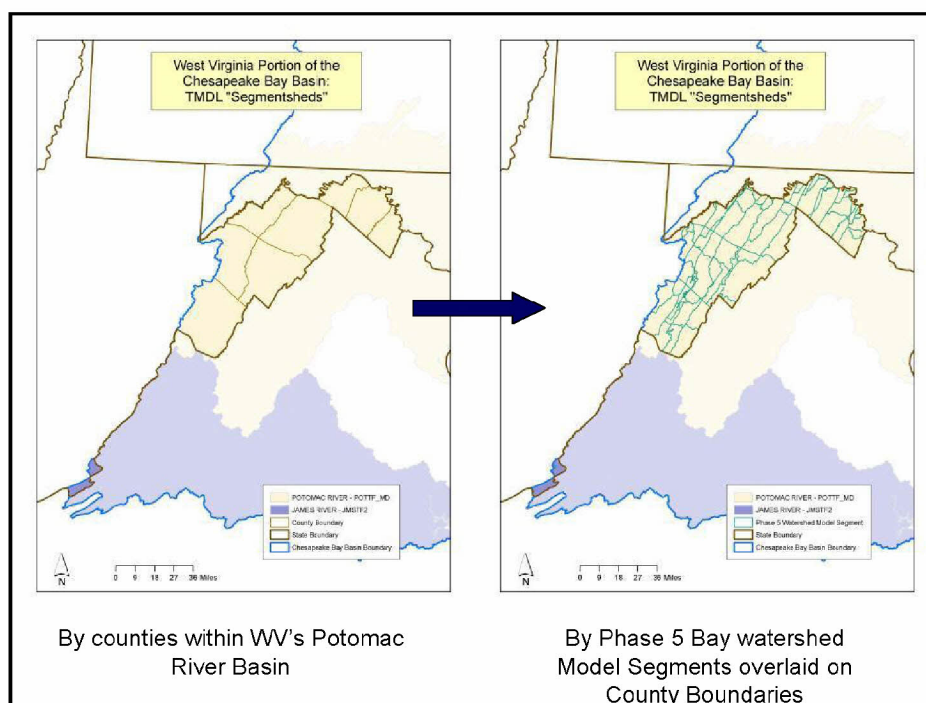
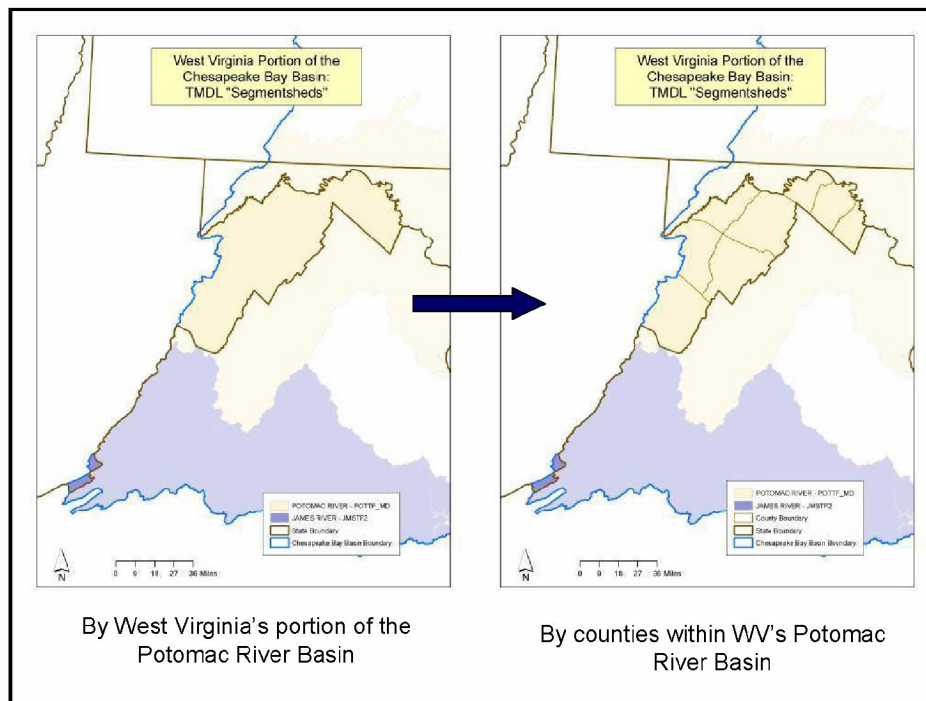
- If States' Bay Water Quality Standards can still be achieved...
  - The State may exchange nitrogen and phosphorus target loads within a basin; and/or
  - The State may exchange nitrogen and phosphorus loads from one basin to another within the State.



## Pollution Diet for Each Tidal Water Segment

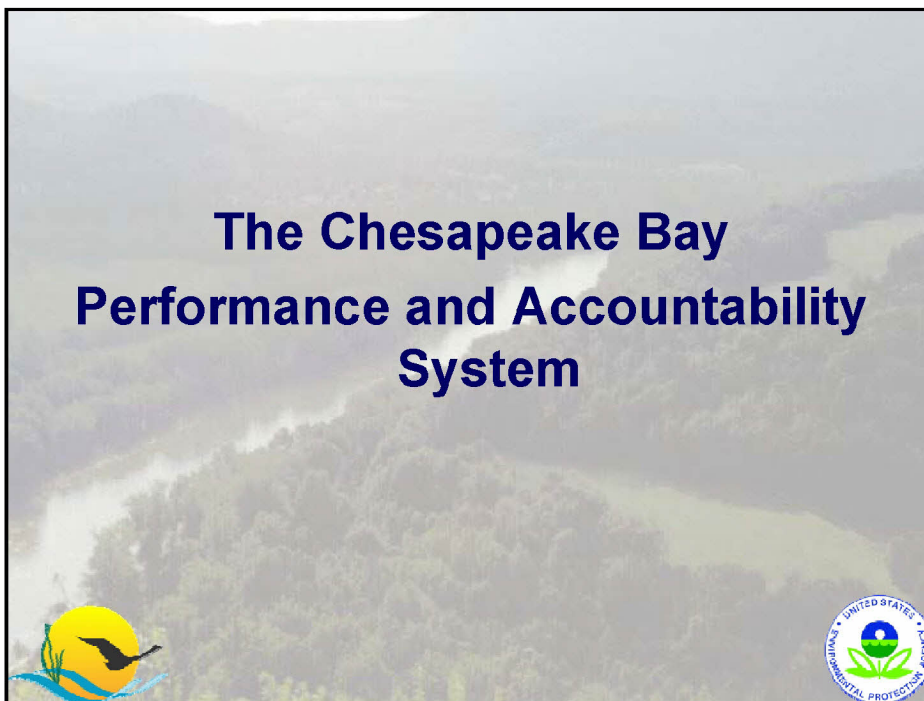




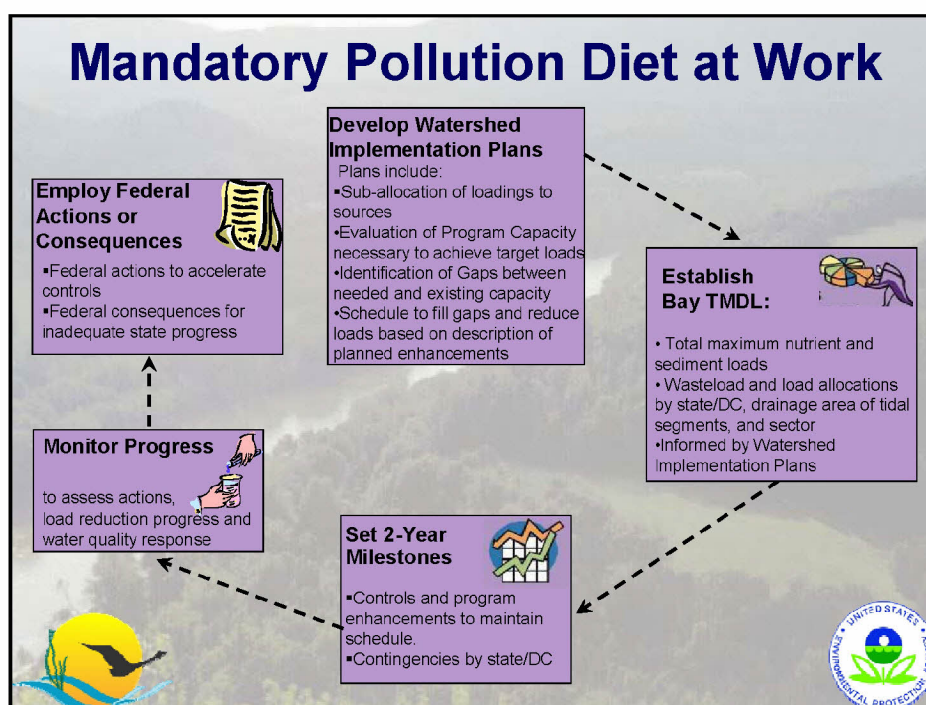




# The Chesapeake Bay Performance and Accountability System



## Mandatory Pollution Diet at Work



## Watershed Implementation Plan Expectations

- Identify reductions by major river basin, tidal segment watershed, county and pollutant source sector
- Identify gaps and strategy for building needed local capacity for pollution reduction actions
- Commit to develop 2-year milestones at the county scale
- Develop contingencies



## Federal Consequences

- Will be outlined in an EPA letter this fall. May include:
  - Assigning more stringent pollution reductions to regulated point sources (e.g., wastewater, stormwater, CAFOs)
  - Objecting to state-issued NPDES permits
  - Limiting or prohibiting new or expanded discharges (e.g., wastewater, stormwater) of nutrients and sediment
  - Withholding, conditioning or reallocating federal grant funds

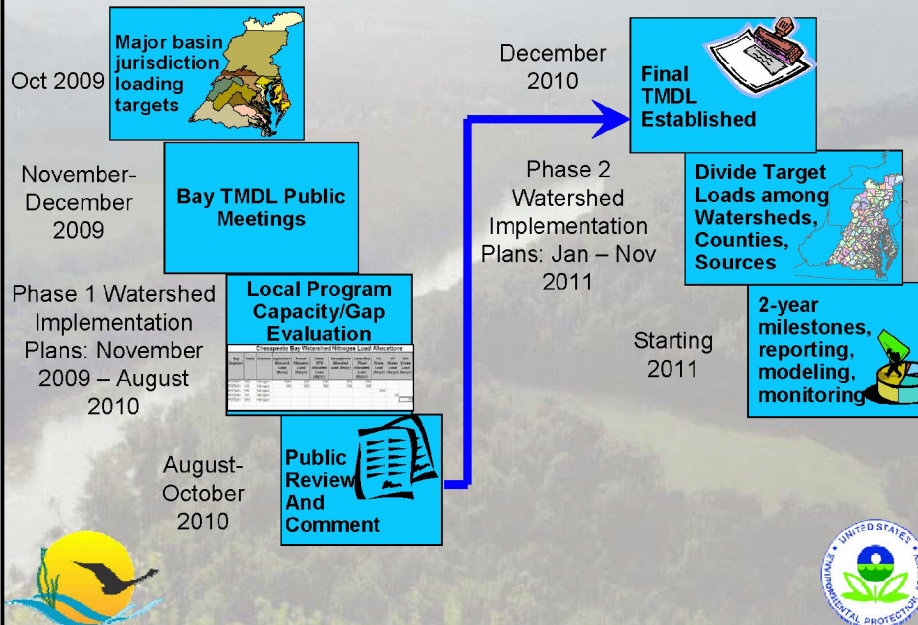


## Bay TMDL- Presidential Executive Order Connections

- Federal commitments to nutrient/sediment reduction actions
- Work in concert to assure pollution cuts
- Promote accountability, performance
- Common components
  - Requirement for state/DC plans to reduce pollutants to meet Clean Water Standards
  - Two-year Milestones to keep pace to 2025
  - Federal consequences if progress lags



## Your Role in Bay TMDL Process





## Bay TMDL: Bottom-line

- Actions will clean and protect local waters in WV thereby supporting the local economy
- Restore a thriving Chesapeake Bay
- Federal, state, local officials and agencies will be fully accountable to the public
- Consequences for inaction, lack of progress



## Further Information

- Chesapeake Bay TMDL web site  
[www.epa.gov/chesapeakebaytmdl](http://www.epa.gov/chesapeakebaytmdl)
- U.S. EPA Region 3 Contacts
  - Water Protection Division
    - Bob Koroncai  
– 215-814-5730; [koroncai.robert@epa.gov](mailto:koroncai.robert@epa.gov)
    - Jennifer Sincock ([sincock.jennifer@epa.gov](mailto:sincock.jennifer@epa.gov))
  - Chesapeake Bay Program Office
    - Rich Batiuk  
– 410-267-5731; [batiuk.richard@epa.gov](mailto:batiuk.richard@epa.gov)
    - Katherine Antos ([antos.katherine@epa.gov](mailto:antos.katherine@epa.gov))





## Questions & Comments



**Thank you for your participation.**



**That concludes today's meeting.**



## Questions Answered:

**\*The letter indicates the source of each question. An “A” indicates that the question was submitted by the live audience, and the “W” indicates that the question was submitted through the webinar. The cards were pre-numbered to easily identify the question once they were submitted. These questions are in the order that they were asked.**

A36: Why not take extra precautions to protect Back Creek, the cleanest remaining river entering the Potomac River?

W1: Is the reduction in oysters due to overharvesting, or poor water quality, or both?

A3: Regulation of septic systems in West Virginia is under county health departments; will the county health departments be part of the TMDL process?

A51: Can the executive order be “undone” by another administration and all of this effort will be halted?

A12a: Will the TMDL include reductions from air deposition?

A12b: The pie chart for nitrogen sources from West Virginia does not include air deposition, why not?

W2: Question submitted: Did you realize that hundreds of puppy mills with thousands of dogs are spreading dog feces on farm fields in Lancaster, PA and elsewhere in the bay basin? This is being permitted by PADEP and USDA. This is a dangerous threat and one that is impacting water quality and certainly is not just a nutrient problem but a pathogen problem for water treatment and shellfish and soil contamination, etc., there are over 100 of these kennels in the Conestoga watershed alone. Please look into this and require that these kennels put in treatment systems – if they are on farms, they get a pass on treating dog feces and just apply it to crops. If you operate a boarding kennel you have to put in a treatment and tanks and containment system costing thousands of dollars because dog waste is a pollutant and a human health hazard. We need EPA to act on this, please. These dog kennels would be point source and could be made to control the waste pollution from the operations.

W2: Paraphrased Question asked: How will the Bay TMDL consider other water quality impairments such as pathogens like fecal coliform? Will the Bay TMDL cause improvements for these pollutants?

A14: What is the source for the annual loadings for nitrogen and phosphorus on slide 13 of your presentation? Charlie Vendernocht, Friends of the Shenandoah River.

A9a: Does the TMDL mean West Virginia will have a finite capacity or ability for future economic development?

A9b: Will the TMDL limit a property owner’s right to use his/her property as he/she sees fit? Does this equate to an unlawful taking of personal property?

W5: Stormwater is a primary pollutant to the Puget Sound. We at the Washington State University Puyallup Research Center are actively involved in developing low impact development research and

application to be used around the sand in all watersheds. What is the role of stormwater runoff in the Chesapeake Bay cleanup and are there working strategies to implement them?

W6a: How many pounds per year of phosphorus and nitrogen does one septic system produce?

W6b: What are the data sources that show failing septic systems are a major contaminant source?

A30a: Brent Walls, Upper Potomac Manager – Potomac River Keepers. How will you measure the potential effectiveness of nutrient reduction from the projects/programs that the states will propose?

A30b: What assurances will local waterways have that nutrient reductions will occur and not be sacrificed for the greater good of the bay?

A30c: Can you give details of the penalties involved when the states do not meet the milestones or propose very weak projects/programs?

A30d: Does the EPA/West Virginia have specific projects/programs that will be most effective for nutrient removal?

A4a: Agriculture is always an easy target for nutrient pollution. Since the Shenandoah passes primarily agricultural land, why is it so much cleaner and clearer than the Potomac?

A4b: There are more deer in the Pan handle of West Virginia than cattle. A number of streams are fenced to restrict livestock access to streams but you can't restrict wildlife and therefore that statistic is faulty.

A4c: Do you include urban lawns and open space in agriculture because Harry Homeowner is less frugal than Frank Farmer who is always mindful of nutrient loss on his farm?

A4d: Can engineering and funding be made available to have municipalities divert effluent from streams to be pumped back onto land in the form of irrigation which will also recharge local aquifers?

A56a: You've mentioned consequences to states. Will there be consequences to counties, either state-initiated or federally, and how can I be assured that localities are actually being properly regulated?

A56b: Will the state push localities harder with regard to enforcing E & S controls and stormwater ordinances and if so, how would they do so?

A42: In 2006, the West Virginia University study stated/recommended "do not recreate boat, swim or fish in the Opequan Creek." Is safe yet for our children to use this waterway?

W8: Can you express what actual BMPs will need to be implemented for landowners, famers, or developers that are above and beyond the present NPDES permits or measures?

W7: How effective have best management practices been in helping West Virginia farms to meet the agreed upon reduction in nutrients and sediment reduction?

A43: Explain the difference between measuring progress toward limiting nitrogen and phosphorus using a model and measuring performance by sampling and testing water. If the model is flawed, could the strategy fail?

A31: What measures are being taken to thoroughly educate State government decision makers on the importance of TMDL compliance?



**Questions submitted but not answered:**

A13: \$?

A38a: What does the model reveal as to the benefits of composting cow and horse manure before it is applied to the land?

A38b: Poultry litter?

A38c: What sort of “credits” could a farmer expect from such a practice?

A40a: Low impact development is considerably more efficient BMP than SWM pond. The downside is that most homeowners will be reluctant to maintain their rain gardens in their yards because it is not economical. Is there any incentive that the government can offer with the annual maintenance cost?

A40b: How do we, as a society, discourage the use of toxic chemicals to clean our pipe drains, to clean and wax our cars, and to fertilize our yards?

A60: What criteria are employed to select site of water sample and timing? Cattle access area will test different from 400 yards upstream or downstream. Time of year affects water quality because of flow from runoff or springs. Same goes for residential and commercial use especially if sampler has an agenda or influenced by someone else who does.

A8a: Might the EPA institute a moratorium on new NPDES permits on 303d listed streams (i.e. Opequan) until those stream come off the list?

A8b: Can EPA institute a uniform buffer zone on all streams in the Chesapeake Bay watershed to prevent new development near stream banks?

A8c: Will EPA upgrade mandatory BMPs on sediment control including better enforcement for violators? In West Virginia we have no DEP or DNR officers in the panhandle dedicated to enforcement.

W3: Shouldn't farms get ag preserve money – lose it if they don't fence stream banks and use other best practices?

A10: Has the West Virginia DEP considered establishing an office in the Chesapeake Bay watershed to administer the Chesapeake Bay Program, including policy development, to permit writing and enforcement?

W11: What if impact cannot be modeled to a specific contamination but rather to general development approach such as increase in impervious surface?

W10: How can local conservation organizations best support EPA's efforts?

A53: Agricultural BMPs have had a large impact reducing nutrients and sediment. However, when we reach a point of diminishing returns, are you (EPA or local partners) prepared to limit animal numbers, cropping systems, and/or total production per farm, watershed (local), county, or state?

W4: It appears that some of the Marcellus Shale area falls in the Bay watershed; this is a relatively new water/land user. How do you see TMDLs being allocated to this user group?

A34a: We are extremely concerned about an expansive massive strip mining permit that is being sought at head waters of mill creek in the Chesapeake Bay watershed. Already the Clean Water Act has been ignored as large amounts of silt, sediment, and other contaminants are flowing unchecked into the watershed. Whom do we contact at EPA to get help in preserving and protecting these watersheds?

A34b: will you review the proposed NPDES permits for this project?

A37: Mining in West Virginia seems to be exempt from environmental laws. West Virginia DEP does not work to protect the environment. What can EPA do to make the state protect and preserve our environment?

A35: If you are truly concerned with Mill Creek of the Opequan, why haven't you stopped Continental Brick Co and North Mountain Shale LLC from cutting the face off of North Mountain, the source of Mill Creek?

A5a: Is the EPA going to target West Virginia failing filtration plants?

A5b: Who came up with facts that show septic tanks as a main source of contamination?

A7: You stated that you wanted ground water to filter down through the earth- don't septic tanks do just that?

A41: What condition is the Opequan Creek in currently?

**Comment Cards:**

A22: Jerry Yates. Question verbally please.

A11: I wish to comment. Paul Burke.

**Jerry Yates:** I want to thank you for the opportunity. The only thing that I would like to press on you is that you come to our local level and you speak strongly of science and sound science and I appreciate that greatly, but I'm not sure that you bring with it the understanding of what happens at the local level and how these things impact all of that. A couple of specific examples that I would give is one; that as we look at efficiency ratings for BMPs that we give to agricultural practices, your website lists all of those that have been under study since 2003. If they haven't been updated, then that's a big problem, and if they have been, we can't really find access to them. And then you mentioned sound science, but then at the same time you mention intersex, but to me, that's mixing sound science with conjecture, and I don't really appreciate that. But to drive home that point of sound science, rotational grazing as a practice, you don't give as much credit for that but there is some very sound science that shows that it is very effective in reducing nitrogen and phosphorus allocations. So then I would question the validity of that model and just remember that the model is only as good as the data we put into it. And we at the local level are the best prepared and ready to address how those local inputs can have the best and most significant reduction, especially at the agricultural level, but also in our communities and in our watersheds.

**Paul Burke – Comments submitted separately**

Nov. 4, 2009

### 1. Include N & P from Leaking Sewer Collection Pipes

EPA estimates that Sanitary Sewer Systems leak 3-10 billion gallons of sewage annually (SSS, not CSOs, p.4-27 of [www.epa.gov/npdes/pubs/csossoRTC2004\\_chapter04.pdf](http://www.epa.gov/npdes/pubs/csossoRTC2004_chapter04.pdf)). Cummins, Associate Director of Living Resources for the Interstate Commission on the Potomac River Basin identifies the same problem in the Bay watershed [www.nesc.wvu.edu/NSFC/Articles/SFQ/SFQ\\_f04\\_PDF/Forum\\_f04.pdf](http://www.nesc.wvu.edu/NSFC/Articles/SFQ/SFQ_f04_PDF/Forum_f04.pdf). Various monitoring methods are available, [listeners.homestead.com/files/sew-leaky.htm](http://listeners.homestead.com/files/sew-leaky.htm).

An EPA issue paper written by American Water Works Service Company repeatedly lists leaking sewer pipes as the leading source of underground bacteria, *Potential for Health Risks from Intrusion of Contaminants into the Distribution System from Pressure Transients*, pp.4-6, 14, [www.epa.gov/safewater/disinfection/tcr/pdfs/whitepaper\\_tcr\\_intrusion.pdf](http://www.epa.gov/safewater/disinfection/tcr/pdfs/whitepaper_tcr_intrusion.pdf)). N and P are discharged with the bacteria.

Other EPA documents put leaking sewer pipes on a par with failed septic systems as sources of contamination:

"contamination can reach groundwater sources, including drinking water wells, from failed septic systems, leaking sewer lines, and by passing through the soil and large cracks in the ground"  
[www.epa.gov/safewater/disinfection/gwr/pdfs/fs\\_gwr\\_finalrule.pdf](http://www.epa.gov/safewater/disinfection/gwr/pdfs/fs_gwr_finalrule.pdf)

EPA makes the same point in, *National Beach Guidance and Required Performance Criteria for Grants*, p. 3-11 [www.epa.gov/waterscience/beaches/grants/guidance/Accessible.pdf/all.pdf](http://www.epa.gov/waterscience/beaches/grants/guidance/Accessible.pdf/all.pdf)

WV DEP estimates that water leaks into new sewer collection pipes at "200 gallons per inch diameter per mile per day" [apps.sos.wv.gov/csdocs/worddocs/47-31.doc](http://apps.sos.wv.gov/csdocs/worddocs/47-31.doc) 47CSR31 App.B-A-2.2. The same figure is a starting point for leaks out of new pipes, where pipes are above the water table, as they are in limestone areas, so there is no external pressure to keep sewage in pipes. Applying this figure would depend on estimating miles of each pipe diameter in each area.

### 2. Include N & P from Sludge

When we take N & P out of liquid sewage, they do not entirely disappear. Sludge is land-filled or land-applied. Some of the N & P therefore travel to the Bay. Land application of sludge is done at maximum levels, quite the opposite of the minimal fertilizer EPA recommends elsewhere, so significant N & P from sludge will reach the Bay and cannot be ignored.

### 3. Include Sediment from Bank Erosion

Speedboat wakes erode substantial sediment from banks in the Bay directly and in its tributaries. All the way from WV to the Bay, spending to armor the riverbanks shows the pervasiveness of bank erosion, and of course large areas remain unarmored and erodible.

Besides wakes, banks are eroded by storms, but storms compensate by flooding banks with new soil. Over millennia, shores have come into balance with natural processes, at least

where wooded buffers are present. By contrast, boat wakes do not raise the water level, so they do not place new soil on banks; they just take and take.

Maryland DNR sponsored a 1980 study which found shore was eroded 6.8 feet, 5.2 feet and zero feet at three sites in the Bay during one year (pages 4-46 & 4-47), Zabawa & Ostrom [boatwakes.homestead.com/files/wakesb.htm#zabawa](http://boatwakes.homestead.com/files/wakesb.htm#zabawa). They did experiments which showed that boats needed to be 500 feet off shore to avoid bank erosion.

Another study in Maryland showed that boats lift sediment from the bottom and re-suspend it, Klein 1997 [www.ceds.org/pdffdocs/Marinas.pdf](http://www.ceds.org/pdffdocs/Marinas.pdf). Other studies around the world show the same problems of bank erosion and bottom re-suspension [BoatWakes.org/files/waket.htm](http://BoatWakes.org/files/waket.htm).

EPA has frequently recognized erosion by wakes, for example: [www.epa.gov/nps/MMGI/Chapter6/ch6-4.html](http://www.epa.gov/nps/MMGI/Chapter6/ch6-4.html) item e [www.epa.gov/nps/mmisp/section4-4.pdf](http://www.epa.gov/nps/mmisp/section4-4.pdf) p.4-27 [www.epa.gov/watershed/initiative/2004/pdf/kenai.pdf](http://www.epa.gov/watershed/initiative/2004/pdf/kenai.pdf) p.1 [www.epa.gov/nps/success/state/pdf/nh\\_middle.pdf](http://www.epa.gov/nps/success/state/pdf/nh_middle.pdf) p.1 EPA needs to recognize wake erosion in the TMDL.

A low estimate is 8 square feet of bank erosion per gallon of fuel burned, [BoatWakes.org](http://BoatWakes.org), or about a quarter ton per gallon, depending on height of the eroded area. Multiply this by the thousands of gallons boats burn each year.

Upstream areas like WV will have strict limits on many activities. While these benefit us, they are driven by the needs of the Bay. It is only right that boaters on the Bay itself and its tributaries have limits on their wakes.

### 4. Include Turbidity Limit on Construction Sites

EPA has a 12/1/09 deadline for developing construction site guidance and is considering a limit on turbidity [www.epa.gov/guide/construction/files/status200908.pdf](http://www.epa.gov/guide/construction/files/status200908.pdf).

Whatever EPA decides in that guidance, to protect streams from turbidity, builders should have a turbidity limit in the Bay watershed, to protect the Bay from sediment.

A cumulative turbidity limit can be established based on desired sediment loads and on the relation between sediment and turbidity. The Cacapon Institute has measured the ratio of NTU to TSS at an average of 0.3 in WV, and ratios can be measured elsewhere [listenv.homestead.com/files/tssntu.htm](http://listenv.homestead.com/files/tssntu.htm). Continuous turbidity monitoring is cheap, and is the only way to ensure low total discharges, since construction discharges vary with rain, cement placement, and other activities which follow no schedule.

Builders who meet a good cumulative output limit measured by a turbidimeter should NOT have to meet input criteria, like ineffective silt fences and storm basins. A turbidity limit can effectively limit sediment and leave great flexibility to builders.